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ABSTRACT

Constructivist theory asserts that children learn through interaction with and adaptation to their environment. Social constructivism emphasizes social interaction in learning, particularly language and the use of language in interaction between the student and his peers or an adult. This paper discusses the relevance of social constructivism, based on the work of Vygotsky, to a constructivist, Piagetian theory-based primary years education program. After describing the constructivist and social constructivist theories of child development and offering several principles derived from these theories which should be borne in mind when organizing a primary classroom, the paper discusses some details of a specific primary program's pedagogy and how it incorporates a constructivist approach. The paper next describes how social constructiyism can be applied to encourage collaboration and cooperative work, which facilitates children's cognitive development. This discussion includes a mention of how the larger social context now demands that children know how to work cooperatively, a description of research that supports the validity of cooperative learning, and how to engender cooperative learning in the classroom. The paper concludes that well-planned cooperative learning can be a powerful organizing principle in constructivist education because it is based on interaction between the student and his or her social environment. Contains 12 references. (JPB)

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Cooperative Learning, its relevance to teachers wishing to successfully implement the Primary Years' Programme of the IB.

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W. Alan Roberts for Swiss Group of International School's Conference March 1998.

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Abstract

Cooperative Learning is a feature of the style of teaching and a style of learning which is embraced by the theories of children's cognitive development known as constructivism and social constructivism.

Constructivism is a theory of development which has the traditional Piagetian model of child development as its support.

Social Constructivism is a theory which was largely promoted by the work of Vygotsky(1978). It puts a great deal more importance on the role of language in the process of cognitive development. The Primary Years' Program of the IBO identifies itself in its literature as a pedagogy supported by these principles.

Because cooperative learning relies on the social aspect of constructivism in the learning process it is an organising principle which is highly suited to meet the demands of the PYP.

Constructivism and Social Constructivism.

"Learning occurs as students actively assimilate new information and experiences and construct their own meanings." (Case and Bereiter 1984) Through interaction with their environment children learn and adapt themselves to their environment. They construct their own knowledge through experience.
Piaget had established this theory of cognitive development and he described three basic stages which children will pass through sequentially.

Sensory Motor stage, practical, the time of babyhood.

Concrete Operations, interiorised actions or mental operations.

Formal operations, adolescence, logical reasoning, the ability to abstract and hypothesise.

What Piaget omitted to consider at the time of his research, was that the child is a social being. He looked at the child as an organism. But children learn in schools which are places where children interact in the process of learning. While all the principles of Piagetian theory hold true the influence of language, the social dimension, enhances the process of cognitive development considerably.

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schools which are places where children interact in the process of learning. While all the principles of Piagetian theory hold true the influence of language, the social dimension, enhances the process of cognitive development considerably.

Vygotsky, who was researching before Piaget, but was only published in English in the 1960's, emphasises that language is inextricably involved with the process of learning. Vygotsky also describes a "Zone of Proximal Development" (ZPD) in the learning process which is the potential the learner can achieve when passing from the known to the unknown. This ZPD is best bridged with the help of a more capable peer or adult who leads the learner to achieve. The process of learning is through language. It is this potential which we exploit when we use co-operative learning techniques in the classroom.

Vygotsky uses the term "scaffolding" learning which helps the learner to move to the next stage in the "zone". The more capable peer or the partner in learning can facilitate this "scaffolding" and it is in collaborative learning that this occurs.

When we examine the characteristics of a "constructivist" classroom (Hein G.E., Prof. 1991) and those qualities which we see described in the PYP documentation which describe how a PYP classroom looks,(ISCP 1996) then we can see correspondences. These in themselves relate closely to the theoretical background I am describing.

<u>The following principles of "constructivist" thinking should be borne in mind when organising a PYP classroom.</u>

1. Learning is an active process in which the learner uses sensory input and constructs meaning out of it.

2. People learn to learn as they learn.

3. The crucial action of constructing meaning is mental, it happens in the mind. Hands on experience is important for young children but ultimately the mind has to be engaged.

4. Learning involves language. Language and learning are inextricably intertwined. (Vygotsky1978)

5. Learning is a social activity.

6. Learning is contextual. We do not learn isolated facts and theories. We learn in relation to what we already know.

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7. We need knowledge to learn. The more we know the more we can learn.

8. It takes time to learn. Repeated exposure, thought and reflection are needed.

9. Motivation is the key component to learning.

From this list we can begin to make better sense of what is described as an "Enquiry Based Curriculum," which is a phrase used to describe the PYP in their documentation. This is probably the closest we get as a description of the theoretical basis of the curriculum. It is a curriculum which is based on "constructivist" principles. Children are led to make their own meaning of the world around them. The student constructs their knowledge, they are not empty vessels to be filled with knowledge.

The "Student Learning Outcomes" and the "Further Concept Questions" of the Planning and Reflecting folder illustrate the way enquiry leads the child to build their own knowledge.

The focus will always be on the learner and how they construct their learning as much as it will be on the material to be taught. There is no predetermined body of knowledge to be transmitted by such a curriculum but the manner itself is the basis of the curriculum.

Compare the statement which appears in the PYP Mathematics pilot curriculum (ISCP 1996).

What is an ISCP mathematics classroom like.?

.....Teachers and students are asking questions.....trying out and

demonstrating in small and large groups.....students visit younger children

to help them with their investigations.....also work with older children

.....other teachers and parents come to share their expertise.....

Language, cooperation, hands on real experience and most important, for our theme, collaboration between students, their peers, older and younger children and

Language, cooperation, hands on real experience and most important, for our theme, collaboration between students, their peers, older and younger children and other teachers and parents.

The Bigger Picture.

When considering the validity of cooperative learning as a organising principle in our classrooms we should be aware that it is a way of working which our culture encourages. We are now preparing children for an adult world where they will be expected to cooperate in teams as students in further education and in the workplace. The modern hi-tech business is no longer a line management system with the boss at the top and a chain of commands and responsibilities down to the humbler workers. The collective responsibility of the group allows imaginative ideas and concepts to be generated and employed. It empowers people with responsibility which will enrich their organisation and themselves. Students for whom the content of their programme has been paramount, where they have been told how or what rather than constructing their own knowledge, who have been reared in an environment of competition where they compete against each other for a limited number of honours, will not be prepared for this world of collaboration.

What specific research supports the validity of cooperative learning?

The classic tests for conservation of length and volume of liquids, which Piaget and Inhelder carried out to determine whether children were in specific stages of cognitive development were later reworked. These same tests were then put into a social context. These well known Piagetian tests were used originally to establish "conditions of logical deductibility," (Piaget 1969). The stage of mental operations of the child could be established by whether they could or could not conserve.

The conservation of liquid test recounted by Inhelder, Sinclair and Bovet(1974) were put into a social context by A.N. Perret-Clermont(1979) to study the effects of social interaction when introduced into the testing situation. Children underwent a pre test and post test. The non conservers are those who, when shown two equal glasses of liquid, admit that there is the same volume in each, but when one is poured into a tall thin container maintains that there is more liquid in the tall thin container. The conserver is deemed to be the one who can justify why there is the same amount of liquid in the tall thin container by arguing that (a) nothing has been added (b) if the quantities were poured back they would be the same (c) the liquid is higher in one glass but wider in the

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other.

The children who were detected as being non conservers on this first test were asked to carry out the test again but this time using orange juice and this time they were to work with a group. The non conserver served the juice to two conservers. They had different shaped glasses but all contained the same volume. Naturally discussion ensued and these so called non conservers were led to see, through the aid of the social context, that the liquids were the same volume. They then got to drink the orange juice.

Then the previous non conservers undertook the test again as a post test and 65% of the previous non conservers were able to be described as conservers and justify their judgment with the points (a), (b) and (c), as above.

The same type of experiment was carried out using the conservation of length task (Doise, Mugny & Perret Clermont 1976) and in (Doise, Giroud & Mugny 1978-9). The non conservers were shown the two rulers with lines of equal length and when they were side by side admitted they were the same length but when in an asymmetrical situation admitted one was longer than the other because it overlapped at the end of the first one. On the intervention of either the tester or another child, a conserver, the previous non conservers, through discourse, were able to see the equal lengths.

Computer based learning provides a fertile area to study the effects of cooperative learning. In earlier implementations of IT in the curriculum of schools the machine was used largely for Computer Assisted Learning (CAL). Maths drills, spelling drills, word recognition etc., were seen as an effective use of computers. Rather like the pigeons in their box in the experiments of behavioural psychologists like Skinner, the child was to peck away in a solitary manner at the key board and receive bleeps and buzzes as rewards from the computer for correct answers.

The present day situation in the use of computers is quite different to this CAL model. Far from inhibiting student interaction the computer can now be seen as a facilitator of interaction. The laptop experiments in our schools have proved that far from isolating learners they interact informally with each other. The teacher is able to provide individual or group tuition often in passing. The structure of the class, the formal management of the lesson, is being changed to become open, discursive and flexible.

Early research had anticipated this potential. The early vision expressed by

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Papert (1993) saw children of 10 years of age working with LOGO, programming, debugging and refining. This allowed young children to work in a highly abstract way solving real problems. It was not the CAL vision but the cooperative vision.

Hawkins (1982) describes collaborative work with LOGO and demonstrates how young children are able to engage in abstract thought when collaborating on a particular task. Again as with the conservation tests, these examples take Piagetian theory a stage further once the tasks are in a social interactive and collaborative setting. In this case the ability of a child to 'abstract' can be seen to be earlier than anticipated in the earlier Piagetian framework.

The Formal Operations stage, the stage when children can operate using abstraction, hypothesis and logical reasoning, was earlier considered to be an adolescent stage. Through examples of children working with computers we see that children as young as eight and nine years, through cooperative learning, through the use of language, can enter this stage far earlier than previously anticipated.

In the computer room, in the classroom, children will turn to the nearest source of information, usually a classmate to seek assistance or collaboration when faced with a problem. The power of this type of collaboration is such that it can be justified that children should always be working together with other students when working with the computer.

The claim that schools, teachers, formal structures of education will no longer be necessary in the age of Information Technology because we have access to all the information we will ever need through the computer, is fallacious because we know that it is interaction which produces learning not solitary acquisition of information.

Engendering Cooperative Learning in the Classroom.

It may be a surprise to know that children do not naturally want to work together in the classroom. Much of the early years of Primary education is spent in helping sociability, sharing, trusting and training the children to be responsible members of a group and responsible members of a class group.

The culture our children are brought up in is one of comparison and competition. These are often the values they bring to school and are encouraged in the home setting. Schools have traditionally operated on an

evaluative basis comparing, ranking, selecting, testing and examining. The traditional school climate is not one of collaboration but of competition. There is a lot to be done in preparing students for collaborative work. The culture of the school has to conform to this belief. At the very least the culture of particular classrooms has to facilitate cooperation in learning.

The following four points are aids towards engendering collaboration and facilitating cooperative work.

1. Model collaborative behaviour as a teacher. A teacher who works in isolation from his/her colleagues will find it difficult to expect their class to cooperate. One of the main features of the planning process to be used by PYP teachers is that they must collaborate together.

2. Use different modes of learning such as drama games to develop a climate of trust in group activities.

3. Use activities which allow students to accommodate each others strengths and weaknesses.

4. Use discourse in groups of children as a regular activity.
   Paired reading, authors' chair, problem solving in mathematics.

It should be accepted that there are some learning activities where collaboration is not appropriate. Writing a poem or story, creating a painting, a clay model etc. are highly personal activities and should be carried out on a personal basis. Sharing the product is another matter and the critique of a piece of work by a peer or class group can be an effective part of the creative process.

Conclusion.

The theoretical basis of the PYP curriculum is constructivist. Social constructivist theory greatly amplifies the learning potential of constructivism. Social constructivism depends on language and the use of language in interaction between the student, his/her peers or more capable peer or adult. The research undertaken in reworking the conservation tests show that in a social context children's cognitive development can advance beyond the bounds of previous conceptions. Well planned cooperative learning can be a powerful educational organising principle because it is based on interaction between the student and his/her social environment.

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